SECTION 28 3110

FIRE DETECTION AND ALARM-ADDITION TO EXISTING

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LANL MASTER SPECIFICATION

When editing to suit project, author shall add job-specific requirements and delete only those portions that in no way apply to the activity (e.g., a component that does not apply). To seek a variance from applicable requirements, contact the ESM Fire/Electrical POC.

When assembling a specification package, include applicable specifications from all Divisions, especially Division 1, General Requirements.

Delete information within “stars” during editing.

Specification developed for ML-3 projects. For ML-1 / ML-2, additional requirements and QA reviews are required.

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Use this Section for additions to existing fire alarm systems. Use Section 28 3100, Fire Detection and Alarm, for new fire alarm systems.

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Edit this section to suit project requirements. When project consists only of Fire Protection, include the following specifications as appropriate in the bid package.

01 1116	Work by Owner
01 3300	Submittal Proceduress
01 2500	Substitution Procedures
01 7700	Closeout Procedures
01 7839	Project Record Documents
21 1313	Wet Pipe Sprinkler System
21 1316	Dry Pipe Sprinkler System
21 1319	Pre-Action Sprinkler System
21 1326	Deluge Sprinkler System
21 1339	Wet Pipe Foam Water Sprinkler System
26 0529	Hangers, Supports and Seismic Protetion
26 0533	Raceway and Boxes for Electrical Systems
26 0553	Identification for Electrical Systems

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PART 1 GENERAL

1.1 SECTION INCLUDES

A. Furnish, design, install, test and place into service an addition to an existing electrically-operated totally solid state, single supervised, closed circuit fire alarm system. The system shall operate at a nominal 24 volts DC, and have supervised open contact alarm circuits. The system shall be complete including alarm initiating devices, notification appliances, modifications to the existing fire alarm control panel (FACP), and accessory equipment necessary for a complete system.

B. Provide a fire alarm system consisting of, but not limited to the following components:

1. Circuits: Conduit and wiring necessary to connect the alarm system panel to alarm initiating devices, notification appliances and auxiliary equipment.

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Edit to match project fire alarm system requirements.
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2. Initiating Devices: [Thermal detectors] [Ionization type smoke detectors] [Photoelectric type smoke detectors] [Duct smoke detectors] [Manual pull stations] [Flow switch(es)] [Pressure switch(es)] [Valve supervisory switch(es)].

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Edit 3. to match project fire alarm system requirements. In general, sounder and signal strobe combination units are for new fire alarm systems. Speaker and signal strobe combination units are for existing systems in which the existing FACP contains a tone generator and audio amplifier. Coordinate with the LANL Fire Protection Group.
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3. Notification Appliances: Speaker and signal strobe combination units. [Sounder and signal strobe combination units].

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Edit to match project fire alarm system requirements.
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4. Auxiliary Devices: [Fan shutdown relays] [Damper operation relays] [Door Holders] [Elevator recall relays].

1.2 SYSTEM FUNCTIONAL DESCRIPTION

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Edit to match the project fire alarm system requirements. Projects with high explosives areas or NFPA-70 hazardous areas will require additional specialized equipment and system characteristics not included in this specification.
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A. Fire alarm initiating circuits shall function as follows:

1. The operation of any fire alarm manual pull station or any automatic fire alarm initiating device (thermal detector, smoke detector, flow switch, main riser pressure switch, etc.) installed in the fire alarm circuit shall:

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Edit to match project fire alarm system requirements.
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a. Energize the FACP common alarm relay

b. Flash the appropriate FACP "zone alarm" LED

c. Transmit the fire alarm signal to the Central Alarm Station

d. Activate the building audio and visual notification appliances for the fire alarm system in a general alarm mode.

e. Activate auxiliary devices including door holders, fan shut-down relays and damper operator relays.

f. Initiate elevator recall for fire fighter=s service.

g. Shut down power to elevator equipment prior to sprinkler operation in elevator equipment room.

2. The fire alarm evacuation tone shall be the "slow whoop" signal. The evacuation alarm tone and visual alarms shall continue until the alarm silence switch has been operated.

3. The operation of the alarm silence switch shall not extinguish annunciator LED on the FACP. The initial receipt of the zone alarm shall cause its associated zone alarm LED to flash until the system alarm silence switch is operated. In the event that a subsequent new fire alarm is received, the fire alarm evacuation tone shall be restarted, indicating a new zone in alarm.

4. The fire alarm initiating circuits shall be two-wire with an end-of-line resistor. FACP shall sense a closed contact as an alarm, and an open circuit as trouble. The two-wire circuit shall be capable of monitoring any un-powered, normally open sensing device, and shall power and monitor automatic detectors (ionization, photoelectric, etc.) which are designed to operate at a nominal 24 volts DC.

B. Supervisory alarm initiating circuits shall function as follows:

1. The operation of any supervisory device (PIV switch, low pressure switch, etc.) shall cause appropriate supervisory signal indication and annunciation at the FACP. The supervisory condition shall continue until the supervisory initiating device has been restored to normal. The actuation of the audible silence switch shall not extinguish supervisory zone indicator lights. In the event that subsequent new supervisory alarms are received, the sequence shall be repeated.

2. The supervisory alarm initiating circuits shall be two-wire with end-of-line resistor and shall sense a closed contact as an alarm, and an open circuit as trouble. The two-wire circuit shall be capable of monitoring any un-powered normally open sensing device.

C. Initiating circuit trouble signal shall function as follows:

The loss of supervision in an initiating circuit shall cause the associated yellow "zone trouble" LED to flash, and the audible trouble signal shall be actuated. The silencing of the trouble signal and its acknowledgment when a fault occurs in an alarm zone, shall not prevent the resounding of the trouble signal in the event of subsequent fault conditions on other zones, alarm signal circuits or other panel trouble conditions.

D. System trouble signal shall function as follows:

The FACP contain an audible trouble alarm signal which will sound in the event of any system trouble condition (control circuit fault, panel trouble, initiating circuit fault, notification circuit fault, etc.) and the associated LEDs shall flash. The actuation of the audible silence switch shall silence the audible trouble signal. AC power failure circuit shall not "latch in".

1.3 SUBMITTALS

A. Provide the following submittals in accordance with the requirements of Sections 01 3300, Submittal Procedures:

1. Submit the following calculations at least 30 days prior to the scheduled start of fire alarm system installation:

a. System battery capacity calculations.

b. Audible signal distribution calculations.

c. Voltage drop calculations.

2. Submit catalog data at least 30 days prior to scheduled start of fire alarm system installation for all equipment furnished under this Section.

3. Submit certifications as follows:

a. Within 30 days after Notice to Proceed, submit certifications of the qualifications of the fire alarm installing firm as described in Paragraph 1.4 of this Section.

b. Within 30 days after Notice to Proceed, submit certifications of the qualifications of the fire alarm system technician as described in Paragraph 1.4 of this Section.

c. Provide certification from the fire alarm control manufacturer that proposed alarm initiating devices, alarm appliances, and auxiliary devices are compatible with the FACP and other auxiliary equipment.

d. Provide "Certificate of Completion" and associated documentation for the completed system in accordance with NFPA 72 prior to the system acceptance test.

4. Submit installation instructions at least 30 days prior to the scheduled start of the fire alarm system installation.

5. Submit materials and parts lists at least 30 days prior to the scheduled start of the fire alarm system installation.

6. Submit shop drawings as follows:

a. Prepare floor plan drawings using a minimum scale of 1/8" = 1-'0" for plans and 1/4" = 1'-0" for details.

b. Hand lettering shall be a minimum of 3/16" and other lettering a minimum of 1/8" to permit microfilm reductions.

c. Show location of FACP, all fire alarm appliances, conduit layout, quantity and type of wires in each conduit, and interface with other systems for functions such as central station signaling, fan shutdown, damper operation, and elevator recall.

d. Show layout of the FACP indicating location of components, interconnection of components, and connections to alarm initiating, indicating, and auxiliary circuits.

e. Submit shop drawings at least 30 days prior to the scheduled start of the fire alarm system installation.

7. Submit test reports as follows:

a. Submit a report of the pre-final tests indicating system status and corrective actions required before the final acceptance tests.

b. Submit a test plan for the final acceptance tests at least 30 days prior to the scheduled final acceptance tests.

c. Submit report of final acceptance test in accordance with requirements in NFPA 72.

8. Submit wiring diagrams as follows:

a. Provide terminal-to-terminal wiring diagrams for alarm and supervisory circuits and interfaces with other systems.

b. Submit wiring diagrams at least 30 days prior to scheduled start of fire alarm system installation.

9. Submit operating and maintenance data.

10. Submit project record documents as follows:

a. Provide updated shop drawings on Mylar reproducible reflecting as-built conditions showing the work completed under this Section. Include notes on special systems or devices, new and existing, locations and actual conduit installation. Include conduit size, conductor size, and number of conductors per conduit.

b. Provide the updated shop drawings on Mylar reproducible media and on electronic media in AutoCAD Adxf@ or Adwg@ format.

11. Submit warranties.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the applicable sections of NFPA 72, *National Fire Alarm Code*, NFPA 101, *Life Safety Code*, and NFPA 70, *National Electrical Code*.

B. Qualifications of the Installing Firm: The installing firm shall:

1. Be licensed by any state in the United States to engage in the design, fabrication and installation of fire alarm systems.

2. Have satisfactorily installed at least twenty fire alarm systems of equivalent nature and scope to the system described in this Section.

3. Provide the services of a qualified fire alarm system technician to design the fire alarm system and to test the completed system.

4. Be a factory certified representative of the manufacturer of the FACP that serves the project.

C. Qualifications of the fire alarm system technician: The fire alarm system technician shall:

1. Be factory trained and certified in the theory, operation, installation, and troubleshooting of the FACP that will serve this project.

2. Have satisfactorily designed at least twenty fire alarm systems of equivalent nature and scope to the system described in this Section.

3. Have satisfactorily field tested at least twenty fire alarm systems of equivalent nature and scope to the system described in this Section.

4. Be NICET (National Institute for Certification in Engineering Technologies) Fire Alarm Certified, or certified by an equivalent organization acceptable to the LANL Authority Having Jurisdiction.

1.5 PRODUCT HANDLING

Materials and Equipment: Protect materials and equipment from damage during shipping, storage and installation.

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Add special product handling requirements for the facility in which this system is to be installed.
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PART 2 PRODUCTS

2.1 GENERAL

A. Provide fire alarm system components that will operate satisfactorily at an altitude of 7,500 ft above sea level.

B. Materials and Equipment:

1. Provide materials and equipment that are new and unused, free of defects, specifically designed for the use intended, conform to the requirements of NFPA 70 and NFPA 72, and are UL listed or FM approved.

2. In existing facilities provide fire alarm system components compatible with existing system.

2.2 CONTROL PANEL AND COMPONENTS

A. The existing fire alarm control panel is a _____ (manufacturer), model _____.

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Edit to match project fire alarm system requirements.
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B. Modify existing panel as required to provide required functions for the expanded fire alarm system. Modifications include [additional zone initiating cards], [alarm output cards], [auxiliary relays][expansion cabinet].

C. Replace battery if required for the expanded system or if the existing battery is more than two years old.

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Use paragraphs 2.3 OR 2.4 to match project fire alarm system requirements. Coordinate with the LANL Fire Protection Group.
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2.3 SOUNDER AND SIGNAL STROBE COMBINATION DEVICES

A. Provide UL listed 24 VDC audio-visual combination-type electronic slow whoop sounder and strobe combination units that are acceptable to the FACP manufacturer and are compatible with the FACP.

B. Sounder shall include slow-whoop generating electronics, audio transducer and screw terminals housed behind a red enamel finished square grille. Sound output shall be field-selectable in at least three steps to at least 99 dBA at 10 feet. Acoustical output shall meet requirements of UL 464.

C. Strobe signal candela output and flash rate per UL 1971 and ADAAG requirements, with xenon flash tube and electronics enclosed in a clear Lexan lens with "FIRE" in red lettering.

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Edit D. to match project fire alarm system requirements.
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D. Provide back boxes and mounting plates for [flush-mounting] [surface-mounting] [surface-mounting outdoors].

E. Manufacturer: Wheelock Model MT-24-LSM-VFR.

2.4 SPEAKER AND SIGNAL STROBE COMBINATION DEVICES

A. Provide UL listed audio-visual combination-type speaker and 24 VDC strobe combination units that are acceptable to the FACP manufacturer and are compatible with the FACP.

B. Speaker, multi-tapped audio transformer, blocking capacitor and screw terminals housed behind a red enamel finished rectangular grille. Audio input shall be 25V. Sound output shall be field-selectable in not less than four steps from 1/8 watt to 2 watts and not less than 75 dBA at 10 feet.

C. Strobe signal candela output and flash rate per UL 1971 and ADAAG requirements, with xenon flash tube and electronics enclosed in a clear Lexan lens with AFIRE@ in red letters.

D. Combination housing shall have a red finish with "FIRE" prominently displayed.

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Edit E. to match project fire alarm system requirements.
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E. Provide back boxes and mounting plates for [flush-mounting] [surface-mounting] [surface-mounting outdoors].

F. Manufacturer: Federal Signal, Model SPAFA-25RHR

2.5 MANUAL PULL STATIONS

A. Provide double-action, non-coded manual pull stations with single-pole, single-throw circuit arrangement, that are acceptable to the FACP manufacturer and are compatible with the FACP.

B. The pull station shall be rigid metal construction and with an all red finish, with the word "FIRE" in white letters.

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Edit C. to match project fire alarm system requirements.
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C. Provide back boxes and mounting plates for [flush-mounting] [surface-mounting] [surface-mounting outdoors].

D. Manufacturer: Fire Control Instruments, Inc., Model MS-2.

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Edit paragraphs 2.6, 2.7, 2.8 AND 2.9 to match project fire alarm system requirements. Coordinate with the LANL Fire Protection Group.
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2.6 THERMAL DETECTORS

A. Provide rate compensated, self-restoring thermal detectors that are acceptable to the FACP manufacturer and are compatible with the FACP.

B. Provide detectors having a stainless steel shell and normally open contact.

C. Temperature rating shall be determined by design unless shown otherwise on the Drawings.

D. Provide horizontal detectors for areas that have suspended ceilings. Provide vertical detectors for equipment rooms and spaces without suspended ceilings.

E. Manufacturer: Fenwal "Detect-A-Fire", Model 27021-0.

2.7 IONIZATION DETECTORS

A. Provide dual chamber ionization type smoke detectors, 24 volts DC, field adjustable, with alarm light indicator. Provide detectors that are acceptable to the FACP and are compatible with the FACP.

B. Manufacturer: Hochiki "Low Profile", Model SIH-24F with Model HS-220D base.

2.8 PHOTOELECTRIC DETECTORS

A. Provide photoelectric type smoke detectors, 24 volts DC, solid-state, utilizing integrated circuit components. Provide detectors that are acceptable to the FACP manufacturer and are compatible with the FACP.

B. Detector shall alarm when the smoke entering the sensing chamber reaches an obscuration level of 1.5 percent per foot.

C. Detector shall contain an alarm indicator light which shall illuminate when the detector goes into an alarm condition.

D. Provide means to functionally test the detector in the field without unplugging the unit or generating smoke.

E. Manufacturer: Hochiki "Low Profile", Model SLK-24F with Model HS-220D base.

2.9 DUCT SMOKE DETECTOR HOUSING

A. Provide duct smoke detector housing containing a photo-electric detector, and providing sampling through one inlet and one outlet tube. The duct smoke detector housing shall operate at 24 volts DC and shall provide an alarm indicator light, relay testing, and reset options. Detector housings shall be capable of sampling in air velocities raging from 500 feet per minute to 3,500 feet per minute.

B. Provide remote test and reset device in the vicinity of the detector. Indicate installation location on submittal shop drawings.

C. Manufacturer: Hochiki, Model HA-UNI-(x)

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Edit 2.10 to match project sprinkler system specifications.
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2.10 AUTOMATIC SPRINKLER SYSTEM

Refer to Section 28 3100 [21 1313] [21 1316] [21 1319] [21 1326] for pressure switches, flow switches and valve supervisory switches associated with the automatic sprinkler system.

2.11 CONDUIT

Refer to Section 26 0533, Raceway and Boxes for Electrical Systems, for conduit systems.

2.12 BOXES

Refer to Section 26 0533, Raceway and Boxes for Electrical Systems for outlet and junction boxes.

2.13 WIRING

A. Color Code: Use the following color code for the fire alarm system:

Black - 120-Volt AC phase wire.
White - 120-Volt AC neutral wire.
Green - System ground wire.
Brown - Negative connection for strobe device.
Orange - Positive connection for strobe device.
Blue - Negative connection for horn circuit.
Yellow - Positive connection for horn circuit.
Gray - Negative alarm initiating device connection.
Violet - Positive alarm initiating device connection.
Black - Negative circuit connection for duct smoke detector reset, HVAC interlock and other auxiliary connections.
Red - Positive circuit connection for duct smoke detector reset, HVAC interlock and other auxiliary connections.
Black/Red Twisted Shielded Pair - Evacuation speaker circuit.

B. Conductors: Provide alarm and supervisory signaling system conductors that meet the requirements of NFPA 70, Article 760 and are UL listed for the type of service to which they will be subjected. Minimum conductor requirements shall be as follows:

1. Low voltage conductors shall be type TFN, No.16 AWG (minimum), thermoplastic insulation, single solid copper conductor.

2. Evacuation speaker or sounder cables shall be jacketed, two No.16 AWG (minimum) twisted and shielded, solid copper conductors.

3. Power conductors shall be type THHN/THWN, No. 12 AWG, thermoplastic insulation, single solid copper conductor.

4. Size conductors of the fire alarm systems as recommended by the manufacturer, based on the operating ampacity of the circuit and the permissible resistance and voltage drop characteristics which will allow proper operation of the equipment. Provide conductors selected to provide not more than 5% voltage drop to the most remote fire alarm device.

2.14 TEST EQUIPMENT

Provide any special test equipment manufactured by the fire alarm equipment manufacturer for maintenance, testing, or troubleshooting.

PART 3 EXECUTION

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Provide fire alarm system design information on the Drawings as required by the LANL Electrical Standards Manual. The requirements below are for the shop drawing level design required for a successful installation.

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3.1 SYSTEM DESIGN

A. Provide the services of a qualified factory trained and certified fire alarm technician for the existing FACP serving this project. The factory technician shall assure the completeness and correctness of the fire alarm system design by performing the following:

1. Prepare shop drawings of any modifications to the FACP indicating location of components, interconnection of components, and connections to alarm initiating, indicating, and auxiliary circuits.

2. Prepare shop drawings of fire alarm layout, conduit and wiring plans. Show location of existing FACP, all fire alarm appliances, including existing devices, conduit layout, quantity and type of wires in each conduit, and interface with other systems for functions such as central station signaling, fan shutdown, damper operation, and elevator recall.

3. Prepare terminal-to-terminal field wiring diagrams for alarm initiating, indicating and auxiliary circuits; detail the interfaces with other systems; indicate labeling of each fire alarm system conductor.

4. Calculate conductor sizes for each alarm initiating, indicating and auxiliary circuit; limit voltage drop to 5% to the most remote device on each circuit.

5. Prepare battery load calculations and select proper battery size.

6. Calculate alarm signal in all spaces to comply with ADAAG requirements: minimum 15 dBA above ambient, but not over 120 dBA at any location.

7. Select alarm initiating, alarm indicating, and auxiliary devices compatible with the existing FACP.

3.2 FIELD CONDITIONS

A. Prior to installation carefully inspect the installed work of other trades, whether pre-existing or part of this project and verify that such work is complete to the point where the installation of the fire alarm system may properly commence.

B. Notify the Contract Administrator should conditions exist, not resulting from work of this project, that prohibits the installation from conforming to applicable codes, regulations, standards and the original approved design.

3.3 INSTALLATION

A. General:

1. Install the fire alarm system in accordance with NFPA 70 NFPA 72, and this specification.

2. Refer to Section 26 0553, Identification for Electrical Systems, for supporting device requirements for fire alarm cabinets, conduit and equipment.

3. Verify dimensions in the field. Lay out work in the most direct and expeditious manner to avoid interferences.

4. The Drawings show only approximate building outlines and interior construction details as an aid in understanding the scope of work. Investigate the structural and finish conditions affecting the work and arrange work accordingly.

5. Coordinate necessary shutdowns of existing systems by notifying the Contract Administrator a minimum of seven working days before rendering such systems inoperative. Do not render inoperative, any system, without the prior approval of the Contract Administrator. The Contract Administrator will initiate and submit the LANL Fire Protection Impairment Procedure.

6. Coordinate fire alarm detectors and associated equipment with existing ceiling or roof materials, lighting, ductwork, conduit, piping, suspended equipment, structural and other building components.

7. Coordinate installation of fire alarm system with work of other trades. Protect fire alarm equipment with suitable coverings until completion of Project.

8. Dispose of equipment removed for completion of this job as directed by the Contract Administrator.

B. Device Mounting Heights:

1. Install manual pull stations with center 42 inches above finished floor.

2. Install combination audible/visual devices with the bottom of the device 80 inches above finished floor or 6 inches below ceiling, whichever is lower.

3. Comply with ADA Accessibility Guidelines (ADAAG) for device mounting heights and locations.

C. FACP Modifications

1. Modify FACP following manufacturer=s written instructions, NFPA 72 and NFPA 70.

2. Install filler plates in unused spaces in FACP.

3. Train conductors in cabinet gutters neatly in groups; bundle and wrap with

cable ties after completion of testing.

4. Tighten electrical connectors and terminals, including grounding connections, according to the manufacturer=s published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A.

5. Mark floor in front of cabinet to show NFPA 70 required working clearances according to Section 26 0553, Identification for Electrical Systems.

D. Wiring Installation:

1. Install fire alarm wiring in raceway.

2. Do not pull wire or cable until the conduit system is complete between pull points.

3. Bundle conductors in panels and boxes in groups by service and destination.

4. Run electronic cable continuous between termination points. No splicing is permitted without prior approval from the Contract Administrator.

5. Make allowances in conductor length at panels and other enclosures to permit forming the conductors neatly within the enclosures. Where wiring troughs are not provided with the enclosures, neatly cable and adequately support the wiring.

6. Ring out and identify power and control conductors before terminal connections are made. Check polarity and phasing and make changes as required before making terminal connections.

7. Test conductors for continuity and for freedom from shorts or unintentional grounds.

E. Junction Box Installation:

1. Refer to Section 26 0533 for installation requirements.

2. Label fire alarm junction boxes with 2-1/4" x 1/2" (minimum size) pressure sensitive vinyl markers having "FIRE ALARM" in red letters on a white background.

F. Conduit Installation:

1. Refer to Section 26 0533, Raceway and Boxes for Electrical Systems, for conduit installation requirements.

2. Space fire alarm cable and conduit six inches away from power cable and conduit.

G. Conductor Identification

1. Label each conductor at each terminal and junction point.

2. Use wire markers specified in Section 26 0553, Identification for Electrical Systems.

3. On wire markers indicate the type of fire alarm circuit (e.g. Pull Stations, Fan Shutdown, Alarm Strobes, etc.).

3.4 PAINTING

A. Exposed Surfaces: Paint exposed fire alarm conduit, panels, cabinets, pullboxes, supports, and other electrical equipment as follows:

1. Galvanized Surfaces: Paint for repairing galvanized materials shall be zinc-rich type.

2. Refinishing: Thoroughly clean and touch up shop primed or finish painted surfaces damaged in handling or installation with paint supplied with the equipment or an approved matching paint.

3. Interior Conduit: Paint new exposed interior conduit in rooms finished and/or occupied to match the existing background paint color. Paint conduit to be painted with one coat of primer. Paint conduit to match the existing background colors with two coats of paint to provide a minimum thickness of 6 mils.

3.5 EQUIPMENT INSTALLATION

Install devices or equipment not specifically covered by these specifications in accordance with manufacturer's instructions.

3.6 CLEANING

Blow out junction boxes and fire alarm equipment not hermetically sealed with clear, dry, oil-free (15 psig maximum) air to remove dust and dirt prior to energizing.

3.7 FIELD QUALITY CONTROL

A. Provide the services of a qualified factory trained technician for the existing FACP that serves this project. The factory technician shall assure the completeness and correctness of the installation by performing the following:

1. Prepare as-built documentation of FACP indicating location of components, interconnection of components, and connections to alarm initiating, indicating and auxiliary circuits.

2. Field verify and mark as-built shop drawings of fire alarm layout, conduit and wiring plans, and point-to-point field wiring diagrams.

3. Verify correct labeling of fire alarm system conductors.

4. Verify that conductor sizes are adequate for each alarm initiating, indicating and auxiliary circuit that is part of this project.

5. Prepare as-built battery load calculations.

6. Measure and adjust audible alarm signal in all spaces that are part of this project to comply with ADAAG requirements: minimum 15 dBA above ambient, but not over 120 dBA at any location.

7. Test all devices that are part of this project for proper supervision and alarm operation; in addition, test 10% of existing devices not directly affected by this project for proper supervision and alarm operation.

8. Test all interlocks with HVAC and elevator system for proper operation.

9. Perform pre-final acceptance inspections and tests of the fire alarm system modifications.

10. Prepare final acceptance test plan.

B. After the pre-final test, provide a report to the LANL Project Leader indicating the status of the fire alarm system and any corrective actions required before the acceptance tests.

C. Submit a detailed test plan for the final acceptance test.

1. Submit the test plan not less than 10 working days before the planned final acceptance date.

2. Follow test methods outlined in Chapter 7 of NFPA 72.

D. Coordinate date of final acceptance test with installer, HVAC sub-contractor, LANL Project Leader and the LANL Fire Protection Group representative. Make corrective actions before final acceptance test date.

3.8 FINAL ACCEPTANCE TEST

A. Notify Contract Administrator 2 working days in advance of final acceptance tests. Perform final acceptance tests in the presence of an authorized representative of the Contract Administrator.

B. Before the final acceptance test begins, present a preliminary copy of the Certificate of Completion to the authorized representative of the LANL Contract Administrator.

1. Preliminary Certificate of Completion shall be of the form required by NFPA 72.

2. Indicate on the preliminary Certificate of Completion that the pre-final inspections and tests have been performed and all corrective actions have been completed.

3. The final acceptance test will not proceed before the Certificate of Completion is presented to the authorized representative of the LANL Contract Administrator.

C. Perform final acceptance tests on the completed fire alarm system.

1. Follow the approved test plan and comply with NFPA 72 requirements.

2. Test FACP and the connected initiating, alarm, and auxiliary devices.

3. Perform discharge test on the FACP battery.

4. LANL will perform tests on connections made by LANL.

D. At the final acceptance test, have marked-up shop drawings and point-to-point wiring diagrams available for review and verification. Final acceptance test will not proceed without these as-built documents. If LANL verification of the as-built documents reveals errors, re-verify the complete fire alarm raceway and wiring system in the presence of a LANL Fire Protection Group representative.

E. Correct deficiencies discovered in the final acceptance test and re-test fire alarm system until satisfactory test results are obtained.

F. Upon successful completion of acceptance tests, submit a final "Certificate of Completion" and "Inspection and Testing Form" as required by NFPA 72.

3.9 SYSTEM IDENTIFICATION PLACARD

A. Furnish and install a permanently mounted placard in or adjacent to the fire alarm control cabinet.

B. Provide the following information typewritten or engraved on the placard:

1. Name, address and phone number contractor that performed modifications.

2. Reference to the standards, including date of issue, to which the system conforms (e.g. NFPA 72 1993 Edition and NFPA 70, 1996 Edition).

3. Circuit number of power supply to FACP and location of the electrical panelboard.

4. Location of fire alarm system Operating and Maintenance Instructions if they are not stored in the FACP cabinets.

5. Location of fire alarm system as-built documents.

END OF SECTION

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Do not delete the following reference information:
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FOR LANL USE ONLY

This project specification is based on LANL Master Specification28 3110, Rev. 0, dated January 6, 2006.